

AMENDMENTS TO THE CLAIMS

This listing of the claims will replace all prior versions and listings of the claims in this application.

LISTING OF THE CLAIMS:

Claims 1-34. (Canceled)

35. (Currently Amended) A method of transmitting a digital data stream in a digital wireless communications system, the method comprising the steps of:

converting said digital data stream into a first stream of information symbols having four or more signal points on a signal constellation defined by ~~through~~ a modulation scheme ~~such that the number of signal points of the first stream of the information symbols is four or more signal points on a signal constellation defined by said modulation scheme;~~

generating a pilot symbol of which a signal point on the signal constellation has an amplitude larger than amplitudes of possible signal points of the first stream on said signal constellation and differs in phase from a particular signal point of the first stream having a maximum possible amplitude among the signal points of the first stream of the information symbols on said signal constellation, wherein the pilot symbol is disposed on either an in-phase axis or a quadrature-phase axis in said signal constellation;

inserting said pilot symbol regularly in said first stream of said information symbols to generate a second symbol stream; and

transmitting a modulated version of said second symbol stream by wireless.

36. (Original) A method as defined in claim 35, wherein said step of generating a pilot signal includes the step of setting said amplitude of said pilot symbol not larger than 1.6 times a maximum possible amplitude of said information symbols.

37. (Previously presented) A method as defined in claim 35, wherein said modulation scheme is a quadrature amplitude modulation.

38. (Previously presented) A method as defined in claim 36, wherein said modulation scheme a quadrature amplitude modulation.

Claims 39 - 40. (Cancelled)

41. (Previously presented) A method as defined in claim 35, wherein said modulation scheme is a quadrature phase shift keying.

42. (Previously Presented) A method as defined in claim 41, wherein said step of generating a pilot symbol includes the step of setting said amplitude of said pilot symbol not larger than 1.6 times a maximum possible amplitude of said information symbols.

Claims 43 - 44 (Cancelled)

45. (Currently Amended) A transmitter for transmitting a digital data stream in a digital wireless communications system, the transmitter comprising:

a converter that is configured to convert said digital data stream into a first stream of information symbols having four or more signal points on a signal constellation defined by through a modulation scheme ~~such that the first stream has four signal points or more on a signal constellation defined by said modulation scheme;~~

a generator that is configured to generate a pilot symbol of which a signal point on the signal constellation has an amplitude larger than amplitudes of possible signal points of the first stream on said signal constellation and differs in phase from a particular signal point of the first stream having a maximum possible amplitude among the signal points of the first stream on said signal constellation, wherein the pilot symbol is disposed on either an in-phase axis or a quadrature-phase axis in said signal constellation;

an inserter that is configured to insert said pilot symbol regularly in said first stream of said information symbols to generate a second symbol stream; and

a transmitter that is configured to transmit a modulated version of said second symbol stream by wireless.

46. (Previously Presented) A transmitter as defined in claim 45, wherein said means for generating a pilot symbol includes means for setting said amplitude of said pilot symbol not larger than 1.6 times a maximum possible amplitude of said information symbols.

47. (Previously presented) A transmitter as defined in claim 45, wherein said modulation scheme is a quadrature amplitude modulation.

48. (Previously presented) A transmitter as defined in claim 46, wherein said modulation scheme is a quadrature amplitude modulation.

Claims 49 - 50. (Cancelled)

51. (Previously presented) A transmitter as defined in claim 45, wherein said modulation scheme is a quadrature phase shift keying.

52. (Previously Presented) A transmitter as defined in claim 51, wherein said means for generating a pilot symbol includes means for setting said amplitude of said pilot symbol not larger than 1.6 times a maximum possible amplitude of said information symbols.

Claims 53 - 54. (Cancelled)

55. (Currently Amended) A reception system for receiving said modulated version of said second symbol stream transmitted in accordance with a method as defined in claim 35, the ~~receiver~~ reception system comprising:

a receiver that is configured to receive said modulated version of said second symbol stream;

an estimating unit that is configured to estimate, by said pilot signal, an amplitude distortion of information symbols between said pilot symbol and a next pilot symbol in said second symbol stream;

a removing unit that is configured to remove said amplitude distortion from said information symbols following said pilot symbol in said second symbol stream by using said estimated amplitude distortion to obtain amplitude-distortion-compensated information symbols; and

a deciding unit that is configured to decide a digital symbol associated with each of said obtained amplitude-distortion-compensated information symbols according to said signal constellation.

56. (Currently Amended) A reception system for receiving said modulated version of said second symbol stream transmitted from a transmitter in accordance with a method as defined in claim 35, the ~~receiver~~ reception system comprising:

a receiver that is configured to receive said modulated version of said second symbol stream;

an estimating unit that is configured to estimate, by said pilot signal, a ~~frequency offset~~ phase error between the transmitter and the receiver in said second symbol stream;

a ~~removing~~ phase compensating unit that is configured to ~~remove~~ compensate said second symbol stream for said frequency offset phase error from said information symbols between said pilot symbol and a next pilot symbol in said second symbol stream by using said estimated ~~frequency offset~~ phase error to obtain ~~frequency offset~~-compensated information symbols; and

a deciding unit that is configured to decide a digital symbol associated with each of said obtained ~~frequency offset~~-compensated information symbols according to said signal constellation.

57. (Currently Amended) A reception system as defined in claim 55, further comprising:

an estimating unit that is configured to estimate, by said pilot signal, a ~~frequency offset~~
~~phase error between the transmitter and the receiver in said second symbol stream~~, wherein

said removing unit has a phase and amplitude compensating unit that is configured to remove
compensate said second symbol stream for said amplitude distortion and said frequency offset
~~phase error from said information symbols between said pilot symbol and the next pilot symbol~~
~~in said second symbol stream~~ by using said estimated amplitude distortion and said estimated
frequency offset to obtain fading-distortion-compensated information symbols, and

said deciding unit is configured to decide a digital symbol associated with each of said
obtained fading-distortion-compensated information symbols according to said signal
constellation.

58. (Currently Amended) A method of transmitting a digital data stream in a digital
wireless communications system, the method comprising the steps of:

converting said digital data stream into a first stream of information symbols having four
or more signal points on a signal constellation defined by ~~through~~ a modulation scheme ~~such that~~
~~the number of signal points of the first stream of the information symbols is four or more on a~~
~~signal constellation defined by said modulation scheme;~~

generating a pilot symbol of which a signal point on the signal constellation has an
amplitude larger than amplitudes of possible signal points of the first stream on said signal
constellation, wherein said pilot symbol is disposed on either an in-phase axis or a quadrature-
phase axis in said signal constellation;

inserting said pilot symbol regularly in said first stream of said information symbols to
generate a second symbol stream; and

transmitting a modulated version of said second symbol stream by wireless.

59. (Currently Amended) A transmitter for transmitting a digital data stream in a digital
wireless communications system, the transmitter comprising:

a converter that is configured to convert said digital data stream into a first stream of
information symbols having four or more signal points on a signal constellation defined by

~~through a modulation scheme such that the first stream has four signal points or more on a signal constellation defined by said modulation scheme;~~

a generator that is configured to generate a pilot symbol of which a signal point on the signal constellation has an amplitude larger than amplitudes of possible signal points of the first stream on said signal constellation, wherein said pilot symbol is disposed on either an in-phase axis or a quadrature-phase axis in said signal constellation;

an inserter that is configured to insert said pilot symbol regularly in said first stream of said information symbols to generate a second symbol stream; and

a transmitter that is configured to transmit a modulated version of said second symbol stream by wireless.